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RESEARCH ARTICLE

EFFECT OF ORAL AND INTRATHECAL CLONIDINE ON SPINAL ANAESTHESIA.

Dr. Anjali Teresa Mathew Ollapally[1] and Dr. Prithi Jain[2].
1. Asst. Professor Dept. of Anaesthesiology, St. Johns Medical College, Bangalore.
2. Associate Professor, Dept. Of Anaesthesiology, Fr. Muller Medical College, Mangalore.

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Abstract

Objectives: To compare the effects of oral and intrathecal clonidine on spinal anaesthesia with 0.5% hyperbaric bupivacaine

Method: 92 patients posted for elective lower limb orthopaedic surgeries were included in this study. They were randomly divided into 3 groups, 30 patients received oral clonidine 2.5 mcg/kg prior to spinal anaesthesia with3cc of 0.5 % hyperbaric bupivacaine, 31 patients were given 75mcg of clonidine intrathecally with 3cc of 0.5% hyperbaric bupivacaine and 31 patients received plain 3 cc of 0.5 % hyperbaric bupivacaine.

Results: The age and weight distribution were similar in the three groups. The onset of sensory and motor blockade was seen to occur earlier in the intrathecal group compared to the other two groups. The degree of sedation was higher among the group that received oral clonidine. There was a statistical significance among the three groups with respect to postoperative analgesia with the intrathecal group having the longest duration. There was no statistical significance among the three groups with respect to the pulse rate and blood pressure and adverse effects.

Conclusion: The addition of 75mcg clonidine intrathecally to 0.5 % hyperbaric bupivacaine for spinal anaesthesia provides better postoperative analgesia, earlier onset of sensory and motor blockade and less sedation as compared to oral clonidine, with both groups demonstrating similar haemodynamic profiles

Introduction:-

Neuraxial blockade, spinal anaesthesia in particular, is a very popular procedure performed for lower abdominal, lower limb, urological and gynaecological surgeries and intrathecal Bupivacaine is the most commonly used drug in day to day practice as it provides longer duration of anaesthesia and is four times more potent compared to its precursor lignocaine.(1)

In order to decrease the adverse effects associated with high doses of a single local anaesthetic agent, neuraxial adjuvants have been advocated.Commonneuraxial adjuvants include opioids, sodium bicarbonate (NaHCO3), vasoconstrictors, alpha-2 adrenoceptor agonists, cholinergic agonists, N-methyl-d-aspartate (NMDA) antagonists and γ-aminobutyric acid (GABA) receptor agonists.(2)

Corresponding Author:- Prithi Jain.
Address: - Assoc. Professor Dept. of Anaesthesiology, Fr. Muller Medical College, Mangalore.

Clonidine is a centrally acting partial alpha-2 adrenoceptor agonist. Its analgesic effect is said to be mediated by binding postsynaptic alpha-2 receptors (G-protein coupled inhibitory receptors) in the dorsal horn of the spinal cord, resulting in its antinociceptive action .[3]

Clonidine has many routes of administration- intrathecal, oral, intramuscular, intradermal, intravenous and epidural.[4] It enhances both sensory and motor blockade from epidural or peripheral nerve block injection of local anaesthetics[3]. It prolongs the duration of analgesia and anaesthesia, resulting in a longer period of post-operative pain relief. [1]Oral clonidine is a cheaper and simpler alternative to its neuraxial counterpart. Clonidine is rapidly absorbed orally with a peak action between 60-90 minutes. This makes it effective as premedication.[5]

Aim:
To compare the efficacy and adverse effects of oral and intrathecal clonidine to find a safe and feasible route of administration of clonidine as an adjuvant.

Material And Methods:-

Ethical clearance was obtained from the ETHICAL COMITTEE of Father Muller Medical College After thorough pre-anaesthetic evaluation, 92 consenting patients undergoing lowerlimb surgery, under spinal anaesthesia were enrolled in the study. They were randomly divided into 3 groups. Group 1 received Tab clonidine 2.5mcg/kgorally 60 minutes before spinal anaesthesia with 0.5% Bupivacaine Group 2 received Clonidine 75mcg (0.5 cc) intrathecally along with 0.5% Bupivacaine Group 3 was the control group with only 0.5% Bupivacaine intrathecally

All patients were kept nil per oral for 8 hours with pre medication of Tab Ranitidine 150 mg orally 12 hours before surgery.

Patients were taught the visual analog pain scale (VAS) (0 = no pain, 10 = worst imaginable pain), and VAS was measured preoperatively at rest and on movement of the knee to be operated. Half hour before the procedure, intravenous access was secured and patients were preloaded with 1000ml Ringer's Lactate solution

In operating room, non-invasive blood pressure, pulse-oximeter, ECG monitors were placed. Baseline SPO2, heart rate, ECG recorded.

Spinal block was administered in the L3-L4 subarachnoid space using a 23G Quincke Babcock spinal needle. Free flow of cerebrospinal fluid was ascertained before injecting the drug.

Sensory block was evaluated by pinprick and motor blockade by Bromage scale. Assessment was repeated each minute till maximum level attained. Intra operatively, non-invasive blood pressure monitoring was done at 0, 2, 5 and every 5 minutes thereafter. Continuous heart rate and SPO2 monitoring was performed. Any fall in BP and heart rate, complaints such as nausea, vomiting or pruritus was recorded, treated and time of occurrence noted. Sedation was assessed by University of Michigan Sedation Scale (UMSS)

Postoperatively, the following was assessed:-

1. Duration of analgesia by Visual Analogue Scale every 20 minutes for the first hour and every hour thereafter
2. Time to requirement for postoperative analgesia (rescue analgesic)
3. Heart rate, Blood pressure, oxygen saturation
4. Postoperative nausea and vomiting.

Discussion:-

The goal of our study was to compare the effects of intrathecal and oral clonidine in spinal anaesthesia for lower limb orthopaedic procedures, especially its effect on postoperative analgesia.

The dosage for intrathecal clonidine was decided in accordance with that used byVan TuijIvan Klei WA, Van der Werff DBM,Kalkman CJ[13] where they concluded that the addition of 75mcg clonidine inrathecally prolonged the duration of postoperative analgesia but did not cause any side effects

The dosage of oral clonidine of 2.5mcg/kg was decided based on the findings of Ezri T, Szmuk P, Shklar B, Katz J, Geva D[6] who concluded that the safe dose of oral clonidine is 2.5mcg/kg, a dose larger than this leads to severe hypotension and bradycardia.

A total of 92 patients who gave informed consent and was posted for orthopaedic lower limb procedures were enrolled in the study.

The patients were randomly allotted into 3 groups. The patients in the oral clonidine group were given 2.5mcg/kg clonidine orally 60mins before spinal anaesthesia. The patients in the intrathecal group were given spinal anaesthesia with hyperbaric bupivacaine 3cc (15mg) and 0.5 cc (75 mcg) clonidine. The patients in the control group were given 3cc of hyperbaric bupivacaine alone.

In our study, 30 patients were enrolled in the oral clonidine group, and 31 patients each in the other two groups. The onset of motor blockade was studied. Among Group 2 (IT), 32.3% of patients had motor blockade corresponding to Bromage 0 between 2-2.9 mins and 41.9% bwteen 3-3.9 mins.

Majority of the patients in Group 1(O) attained motor blockade between 3-3.9min (70%) and among the control group Group 3 (C), motor blockade was delayed with majority of patient achieving Bromage 0 after 4 mins of administering spinal anaesthesia.

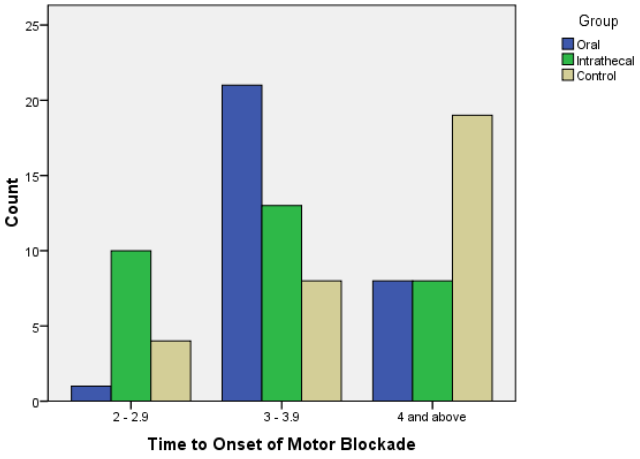

Fig 1:- Onset of motor block

Table1:-Onset of motor block.

			Group			Total
			Oral	Intrathecal	Control	
Time of onset of sensory blockade	1 – 1.9	Count	0	4	0	4
		% within Group	.0%	12.9%	.0%	4.3%
	2 – 2.9	Count	24	17	20	61
		% within Group	80.0%	54.8%	64.5%	66.3%
	3 and above	Count	6	10	11	27
		% within Group	20.0%	32.3%	35.5%	29.3%
Total		Count	30	31	31	92
		% within Group	100.0%	100.0%	100.0%	100.0%

The results of the sensory blockade corresponded to the motor blockade, with the majority of patients in Group 1 attaining adequate sensory blockade between 2-2.9 mins (80%) and half of the patients of Group 2 (54.8%).

Among the rest of the Group 2 patients, 32.3% had sensory blockade after 3 mins whereas a minority attained sensory blockade between 1-1.9min (12.9%)

The patients in Group 3 (C), 64.5% showed sensory blockade at 2-2.9 mins and 35.5% at a time greater than 3 mins.

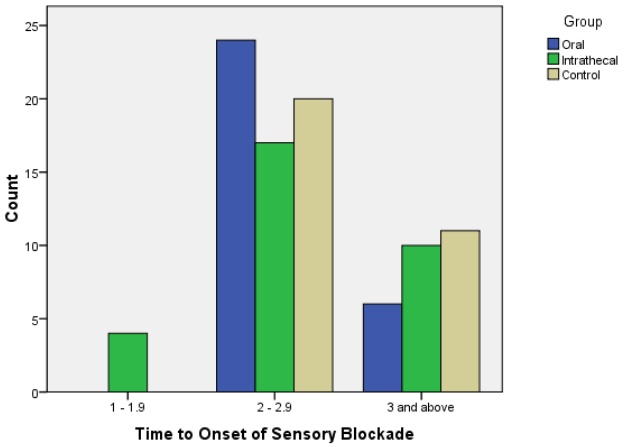

Fig 2:-Onset of sensory block

Table2:-Onset of sensory block

			Group			Total
			Oral	Intrathecal	Control	
Sedation	0	Count	0	0	31	31
		% within Group	.0%	.0%	100.0%	33.7%
	1	Count	12	20	0	32
		% within Group	40.0%	64.5%	.0%	34.8%
	2	Count	18	11	0	29
		% within Group	60.0%	35.5%	.0%	31.5%
Total		Count	30	31	31	92
		% within Group	100.0%	100.0%	100.0%	100.0%

The degree of sedation was compared in all 3 groups. All the patients in Group 3 did not experience any sedation (100%), whereas 60% of patients in Group 1 experienced moderate sedation and 40 %, mild sedation.Among the patients in Group 2, 64.5% of patient's experienced mild sedation and 35.5% experienced moderate sedation.
Therefore while all patients who were administered intrathecal clonidine experienced some amount of sedation ,either mild or moderate, the degree of sedation was greater among the patients who receieved oral clonidine before the subarachnoid block, majority of them experiencing moderate sedation.

Ezri T and associated in 1998, concluded that oral clonidine causes anxiolysis and sedation, however they inferred that oral clonidine does not prolong sensory blockade. This is in contradiction to the findings in our study.[6]

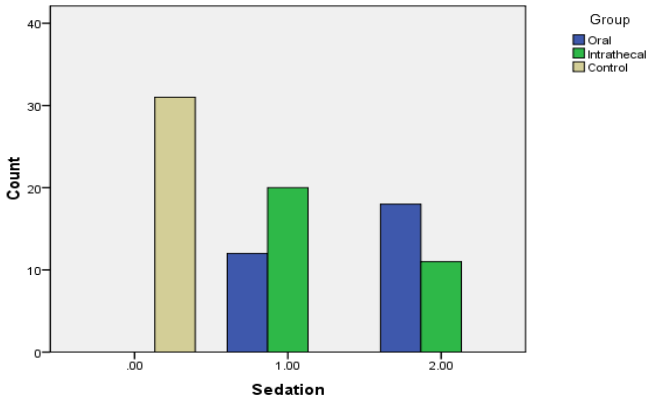

Fig 3:- Sedation in various grou

One of the most important objectives studied was the duration of postoperative analgesia in all the 3 groups. All groups were significantly different form each other with respect to the duration of postoperative analgesia ($p<0.001$) with median values of 280mins for Group 1, 370 mins for Group 2 and 240 mins for Group 3.

The findings corresponded to that studied by Neimi et al [10] and Dobrydnjov I et al [5] where they found that duration of sensory and motor blockade is prolonged more with intrathecal clonidine than with oral clonidine.

Table 3:-Duration of analgesia

		Duration of Analgesia			
		Median	First Quartile	Third Quartile	95% confidence interval for median
Group	Oral	280	250	300	(270, 289)
	Intrathecal	370	350	420	(360, 420)
	Control	240	200	280	(215, 270)

The haemodynamics were compared in the three groups, in the intraoperative and postoperative period.
During the preoperative and intraoperative period, the pulse rate, systolic blood pressure and diastolic blood pressure were comparable among all the groups during the first 40 minutes.

In the postoperative period, the haemodynamic parameters were comparable in Group 1 and Group 2. The control group, Group 3, however showed a steady rise in pulse rate, systolic blood pressure and diastolic blood pressure after 60 minutes.

There was no statistical significance with respect to the haemodynamic parameters, among the groups. The VAS scores were analysed in all three groups at time intervals- 0mins, 10mins, 20mins, 40mins, 60mins, 90min and 180mins.

Any patient with a VAS score of ≥ 4 was administered the rescue analgesic. All patients experienced a VAS score < 4 upto 120 mins.At the 180mins time interval, 1 patient from Group 1 (3.3%) and 7 patients from Group 3 (22.6%) noted a VAS score of 4.There was no statistical significance among the groups.
There was no incidence of nausea and vomiting in all 92 patients and only one patient experienced ectopics during the intraoperative period, which resolved spontaneously.

Summary:-
Spinal anesthesia is a type of central neuraxial blockade that is indicated for lower abdominal and lower limb surgeries. It is economical, easy to administer and very effective in producing motor, sensory and sympathetic blockade.

In our study we have compared the effects of oral and intrathecal clonidine on spinal anaesthesia with 0.5% hyperbaric bupivacaine for orthopaedic lower limb surgeries.

In this study we have shown that:-
1. The demographic profile was comparable in all the groups
2. Earliest onset of sensory blockade was observed in the intrathecal group within 1-1.9 mins (12.9%) ,followed by oral clonidine group within 2-2.9 mins (80%)
3. Onset of motor blockade was observed earliest in the intrathecal group within 2-2.9 mins(32.3%), followed by the oral group within 3-3.9 mins (70%)
4. Highest degree of sedation (moderate) achieved by oral group ,followed by intrathecal group(minimally sedated)
5. The longest duration of postoperative analgesia was documented in the intrathecal group,, followed by the oral group.
6. The intraoperative haemodynamics were similar in the three groups
7. Postoperative pulse rate and blood pressure was more stable in the intrathecal and oral groups.

We conclude that for elective lower limb orthopaedic surgeries, intrathecal clonidine with 0.5 % hyperbaric bupivacaine provides better postoperative analgesia, earlier onset of sensory and motor blockade and less sedation as compared to oral clonidine, with both groups demonstrating similar haemodynamic profiles.

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